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BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

Application Number: 09/664,332
Filing Date: September 18, 2000
Appellant: HAYASHI, NORIYA

Daniel A. Geselowitz
For Appellant

SUPPLEMENTAL EXAMINER'S ANSWER

This is in response to the reply brief filed February 21, 2006 addressing the Examiner's answer mailed December 21, 2005.

1. Hamazu et al. discloses from 0.01 parts by weight of of benzyl-4-hydroxyphenylmethyl sulfonium hexafluoroantimonate embraced by claimed general formula (IV) (col. 3, lines 29-30 and the col. 7 catalyst) and an acid anhydride (col. 5, line 14).

2. Buchwalter et al. sets forth from about 0.5% to about 10% by weight based on the solid resin weight (col. 7, lines 2-4 of a hydroxyaryl dialkyl sulfonium hexafluoroantimonate or hexafluorophosphate (col. 4, line 57 to col. 5) and a cyclic anhydride such as maleic anhydride (col. 6, lines 50-54 and 64-65, utilized in Examples 1-9 on pages 65-69 of the instant specification).
Example 1 (col. 9, lines 53-55) shows a calculated molar ratio of hexahydrophthalic anhydride:acetal diepoxide of 0.93:1.

3. Starkey et al. reports from 0.1 to 4 parts by weight based on the solid components (col. 13, lines 10-14) of an aromatic sulfonium salt of a halogen-containing complex ion (col. 12, lines 35-36) and from about 0.01 to 10 parts by weight based on 100 parts by weight of the resin component (col. 21, lines 12-16 of a thermohardening catalyst such as maleic anhydride (col. 20, lines 38-39). A calculated molar ratio of thermohardening catalyst to epoxy resin based on 10 parts by weight of maleic anhydride per 100 parts by weight of 3,4-epoxycyclohexylmethyl-3,4-epoxycyclohexane carboxylate is 0.32:1.

4. Green espouses from 0.1 to 20 parts by weight per 100 parts by weight of the epoxide resin (col. 8, lines 9-11) of an aromatic sulphonium hexafluoroantimonate or hexafluorophosphate (col. 5, lines 49, 53, 56 and 57).

5. Thus, each of the references discloses an amount of photopolymerization initiator embracing the claimed range of from 0.1 to 6.0 parts by weight per 100 parts by weight of the whole weight of the other components.

6. Buchwalter et al. and Starkey et al. establishes a molar ratio of acid anhydride to epoxy resin within the claimed limits of from 0.03:1 to 1.4:1.

7. It would have been obvious to utilize the anhydride curing agent of Hamazu et al. and Green at the molar ratios of 0.32:1 or 0.93:1 within the realm of Starkey and Buchwalter et al., respectively, in order to complete the curing of the epoxy resins and to attain sufficient strength without crystal precipitation of decreased stability (Starkey, col. 21, lines 17-23).

8. Accordingly, based on the combined teachings of Hamazu et al., Buchwalter et al., Starkey and Green, acid anhydride and sulfonium salt curable epoxy resin compositions with molar ratios of acid anhydride to epoxy resin and a level of sulfonium salt within the claimed parameters are recited.

9. In order to evaluate whether a given reference addresses each of the claimed limitations, the teachings of the reference as a whole must be consulted, especially if a particular claimed aspect has not been mentioned. Buchwalter et al. in Example 1 shows a molar ratio of 0.93:1. Since Example 1 is the only source of ascertaining the relative amounts of acid anhydride and acetal diepoxide, a calculation based on its showings is reasonable because this is the closest prior art example. Although Example 1 also exhibits a content of photoinitiator greater than the claimed maximum, its teachings cannot be construed to be confined merely thereto. Buchwalter et al. describes from about 0.5% to about 10% by weight based on the solid resin weight of a hydroxyaryl dialkyl sulfonium hexafluoroantimonate or hexafluorophosphate encompassing the claimed boundaries.

Therefore, an epoxy resin formulation with from about 0.5% to about 10% by weight of hydroxyaryl dialkyl sulfonium salt and molar ratio of acid anhydride to acetal diepoxide of 0.93:1 is clearly within the confines of Buchwalter et al.

10. Starkey sets forth from about 0.01 to 10 parts by weight based on 100 parts by weight of the resin component of a thermohardening catalyst admittedly embracing a wide variety of species such as myriad acid anhydrides (col. 20, lines 33-49) among which maleic anhydride repeatedly utilized in the examples of the instant specification is listed (col. 20, lines 38-39). It is clearly within the purview of Starkey to employ any of the disclosed species of thermohardening catalysts at a concentration of as much as 10 parts by weight. Therefore, the use of 10 parts by weight of maleic anhydride per 100 parts by weight of epoxy resin is within the prior art teachings, which converts to a molar ratio of 0.32:1.

11. A claimed feature is not unobvious just because it is not recognized in the prior art. If it can be established within the information contained in the reference that such a feature is present, the burden of proof shifts to appellant to indicate the criticality of the claimed feature. It has been confirmed that a molar ratio of 0.32:1 is within the ambit of Starkey. None of the evidence presented in the specification establishes the criticality of the claimed molar ratio range, especially considering the exemplified molar ratio of 0.93:1 shown in Example 1 of Buchwalter et al.

12. The discussion in Starkey of the problems of exceeding an amount of about 4 parts by weight of photopolymerization initiator causing insufficient hardening of the lower part still embraces about 4 parts by weight which is within the claimed range of from 0.1 to 6.0 parts by weight. Starkey attributes insufficient hardening of the lower part using contents of photopolymerization initiator in excess of about 4 parts by weight. Therefore, one skilled in the art would question the capacity to completely harden an article at the claimed maximum of 6.0 parts by weight, especially since only levels of 0.5, 1.0 and 1.5 parts by weight has been tested in Declaration II filed May 13, 2004. The evidence is not commensurate in scope with the claimed amount of photopolymerization initiator of as high as 6.0 parts by weight.

13. The claims broadly denote a "photopolymerizable resin component" embracing such functionally and structurally diverse types as various unsaturated (meth)acrylates, unsaturated polyesters, polyene/thiols, silicons, polybutadienes, acryl monomers, vinyl ethers and cyclic ethers possessing different curing mechanisms from the solely tested Celloxide 2021P, or 3,4-epoxycyclohexylmethyl-3,4-epoxycyclohexane carboxylate (specification, page 26, lines 4-18). Experimentation with a single kind of cycloaliphatic epoxy resin (which may or may not be representative of other epoxies such as the listed epoxidized polyolefins and epoxy monomers) does not confer patentability on such different species of resins, some of which contain unsaturated functional groups, others which are merely compounds or monomers, and including resins with completely unrelated structures (i.e. silicons and polyene/thiols).

14. There is no evidence of record that the tested results are applicable to the aforementioned diverse species of photopolymerizable resin components cured with an acid anhydride and sulfonium salt of general formula (IV), (IV') or (V).

Respectfully submitted,

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2/28/2006